REMARKS

Claims 1-2 and 4-27 are pending in this application. By this Amendment, claims 5, 10, 12, 15-16, 19, 21 and 27 are amended. Various amendments are made to the claims for clarity and are unrelated to issues of patentability.

The Office Action rejects claims 1, 2, 4, 6-15 and 24-27 under 35 U.S.C. §103(a) over JP 2002341775 to Toshiba Corp (hereafter Toshiba) in view of U.S. Patent 5,151,631 to Oda et al. (hereafter Oda). The Office Action also rejects claims 22-23 under 35 U.S.C. §103(a) over Toshiba, in view of Oda and U.S. Patent 5,854,617 to Lee et al. (hereafter Lee). The rejections are respectfully traversed with respect to the pending claims.

Independent claim 1 recites a light source unit for providing light to the LCD panel, a power supply unit for generating a low direct current (DC) voltage, a high-voltage generator for outputting to the light source unit a high voltage based on the low DC voltage, and a feedback control unit for detecting a voltage induced from the high voltage output, for determining based on a level of the induced voltage an abnormal condition of the high voltage output, and for inhibiting the output of the high-voltage generator during a time corresponding to the abnormal condition by suspending operation of said power supply unit during the time corresponding to the abnormal condition. Independent claim 1 also recites that the feedback control unit comprises a patterned conductor for conducting the induced voltage to said feedback control unit.

The applied references do not teach or suggest at least these features of independent claim 1. More specifically, the Office Action primarily relies on Toshiba for the claimed

features. However, applicant respectfully submits that Toshiba does not suggest the features as alleged in the Office Action.

The Office Action mischaracterizes Toshiba's transformer inductive pattern 32 as corresponding to the claimed patterned conductor. The Office Action also mischaracterizes Toshiba's corona discharge detector 54 and transformer inductive pattern 32 as corresponding to the claimed feedback control unit. For example, Toshiba's inductive patterns 32 and 34 are respectively configured to respond to a corona discharge detected in one or both of the transformer 30 and the lamp 22. Toshiba's inductive patterns 32 and 34 are not configured to respond to an abnormal level of high voltage output from an inverter circuit. Toshiba's presence of a corona discharge somewhere in a ballast is not an abnormal condition of a high voltage output. Therefore, Toshiba does not suggest to respond to abnormal conditions such as a high voltage output experiencing a power surge, a high voltage output having an unusually low voltage level, or where there is no voltage output being generated (as described in the present specification). See, for example, dependent claim 24. More specifically, Toshiba does not teach or suggest a feedback control unit for detecting a voltage induced from the high voltage output, and for determining based on a level of the induced voltage an abnormal condition of the high voltage output, as recited in independent claim 1.

As one non-limiting example in the present specification, power surges such as a sudden change (up or down) in voltage or current detected at an output of high-voltage generator may result upon powering up an LCD monitor, and low-voltage outputs and zero-voltage outputs may be indicative of a variety of related system failures, such as an electrical open. In contrast,

Toshiba is limited to detection of over-current conditions and one of two specific types (areas) of corona discharge. The present specification relates to detection of a variety of fault conditions that may include over-current regulation, using the patterned conductor disposed electromagnetically proximate to an electrical output of the high-voltage generator and to an electrical input of a light source unit. See, for example, dependent claim 4. Additionally, independent claim 1 specifically recites a feedback control unit for detecting a voltage induced from the high voltage output and for determining based on a level of the induced voltage an abnormal condition of the high voltage output. Toshiba does not teach or suggest at least these features of independent claim 1.

Toshiba discloses an inverter circuit 42 using a stop signal output from one or more of the corona discharge circuits 54 and 66 (as well as control IC 44), and that the inductive patterns 32 and 34 are respectively configured to respond to a corona discharge detected in one or both of the transformer 30 and the lamp 22. This does not teach or suggest to respond to an abnormal level of high voltage output from the inverter circuit 42. See independent claim 1 reciting a feedback control unit for detecting a voltage induced from the high voltage output (of the high-voltage generator). Toshiba's inductive patterns 32, 34 are provided with respect to two specifically selected circuit elements. However, a presence of a corona discharge somewhere in a ballast does not suggest an abnormal condition of a high voltage output. See independent claim 1 reciting a feedback control unit for determining based on a level of the induced voltage an abnormal condition of the high voltage output. The citation makes use of separate inductive patterns (i.e., the transformer inductive pattern 32 and the lamp inductive pattern 34) connected

to a pair of corona discharge detection circuits 54 and 66 arranged in tandem and reacting to a filtered signal (high-pass or low-pass) peculiar to corona discharges.

Additionally, Toshiba teaches two inductive patterns and two correspondingly induced voltages, that these patterns are specifically arranged in predetermined areas (i.e., adjacent exactly two elements of a flat-panel display), and that the selected location for the patterns correspond to a local susceptibility of corona discharge problems. On the other hand, in the present specification, the location of the conductor is chosen in consideration of different factors, such as a best place for an accurate measurement of fluctuating levels of a high voltage output being supplied to a light source unit.

The Office Action apparently considers only the transformer inductive pattern 32 as corresponding to the claimed patterned conductor. The Office Action does not associate the inductive pattern 34 as corresponding to the claimed patterned conductor. It is unreasonable to focus on the transformer inductive pattern 32 that exhibits no substantive differences from the lamp inductive pattern 34, which has a same configuration and is connected to a corresponding corona discharge detection circuit. That is, corona discharge detection circuits 54 and 66 are equivalent circuits operating in tandem. This fully parallel configuration means that inclusion of the transformer 30 in the set of components to be checked for corona discharge is unrelated to its being a source of a high voltage output.

There is no basis in the prior art for modifying the set of inductive patterns 32, 34 for monitoring an incidental voltage field so as to reach the features of independent claim 1. Any alleged modification would require moving one of the inductive patterns 32 and 34 (or adding

another pattern at) to a location that is not taught, for a purpose that is not taught, while adapting Toshiba's specifically described pattern configuration (i.e., a thin film made of copper formed in a shape of a quadrangle having sides of 1cm and arranged directly below a target electrical component) to a configuration for achieving a new purpose. There is no basis in the prior art for this type of modification.

Even further, though Toshiba's configuration were combined with an over-current detection means, i.e., A/D converter 52 and control IC 44, to produce a feedback control circuit responsive to one set of undesirable conditions in a ballast, this configuration would still fail to respond to an abnormal condition of a high voltage output (of a high-voltage generator). That is, embodiments of the present specification may achieve a detection of a variety of fault conditions that may include over-current regulation using just one patterned conductor disposed electromagnetically proximate to an output of the high-voltage generator and to an input of light source unit.

In sensing corona discharge from a circuit element (e.g., a transformer or lamp) a determination of the presence of a corona discharge condition (and its associative adverse effects) is detected within either of these elements. Toshiba monitors an incidental voltage field induced into an adjacent area occupied by one of the inductive patterns 32 or 34, and a corresponding corona discharge condition is determined (indicating corona presence) when a high-frequency component appears in a waveform of the induced voltage. Drawbacks of electrical coronas and the electromagnetic fields radiated by conducting bodies in corona include

noise generation, lossy transmission, and a progressive damage to the insulating materials inside electrical components (e.g., electric motors, generators, and capacitors as well as transformers).

The presence of a corona discharge condition is not necessarily an abnormal event in a liquid crystal display and is certainly not indicative of an abnormal voltage level present at an output of an inverter circuit supplying high voltage to a lamp. Rather, Toshiba's voltage detection has no discernable "normal" state, and the detection methodology is indirect (i.e., a reaction to a filtered high-frequency component appearing in the waveform of the induced voltage). Thus, Toshiba does not detect an abnormal voltage level by either of the inductive patterns 32 and 34, only one of which the Office Action compares to the claimed patterned conductor. The present specification describes the patterned conductor as a trace or pattern formed on a printed circuit board disposed electromagnetically proximate to an electrical output of a high-voltage generator 330, which due to a direct coupling method between elements 300 and 100, directly corresponds to an electrical input of a light source unit. After a proximity-based induction, the patterned conductor (PCB pattern) conducts the induced voltage to the feedback control unit where the only concern is level. In contrast, Toshiba's detection operation relies on presence of a high frequency component in an induced voltage.

A common problem to be solved is avoidance of damage to an LCD lamp unit. The present specification requires detection of a voltage induced from the high voltage output to determine an abnormal condition based on a level of the induced voltage. See the corresponding features of independent claim 1. Thus, in addition to avoiding damage to the LCD lamp unit, the present specification also solves a related problem of damage that may occur to one or more of

the power supply unit 310, the DC/DC converter 320 and the high-voltage generator 330. On the other hand, Toshiba's over-current detection is solely for protecting the lamp so that a set of undesirable conditions in the ballast to which a feedback control circuit is responsive consists of a corona discharge condition detected in either one of two elements (namely, the transformer 30 and the lamp 22) and a typical over-current condition. The abnormal condition in the present specification is based on a detection at the output of the high-voltage generator 330 and includes a detection of any one of a sudden increase in its voltage or current, a sudden decrease in its voltage or current, an abnormally low voltage output, and zero voltage output. Thus, the present specification considers the aforementioned over-current condition but is unrelated to corona discharge conditions.

The mere use of inductive coupling for part of a complex control of the drive circuit of a light source in a flat-panel display device does not teach or suggest the features of independent claim 1. It is further improper to modify Toshiba to arrive at the claimed features. The result of such a modification may only net a detected presence within an incidental voltage field of a high-frequency component indicative of corona discharge at some site inside an LCD monitor. Such detection may not be used to guard against all the consequences of the aforementioned states (abnormal conditions) of the output voltage level.

For at least these reasons, Toshiba does not teach or suggest all the features of independent claim 1. That is, Toshiba does not teach or suggest a feedback control unit for detecting a voltage induced from the high voltage output, for determining based on a level of the induced voltage an abnormal condition of the high voltage output, as recited in independent

claim 1. Oda and Lee do not teach or suggest the features of independent claim 1 missing from Toshiba. Thus, claim 1 defines patentable subject matter.

Independent claim 15 recites a high-voltage generator for outputting to the light source unit a high voltage based on the predetermined DC voltage, and a feedback control unit for detecting a voltage induced from the high voltage output, for determining based on a level of the induced voltage an abnormal condition of the high voltage output, and for inhibiting the output of the high-voltage generator during a time corresponding to the abnormal condition by suspending operation of said power supply unit during the time corresponding to the abnormal condition. Independent claim 15 also recites that said feedback control unit comprises a printed current board (PCB) pattern disposed electromagnetically proximate to an electrical output of the high-voltage generator and to an electrical input of the light source unit, for conducting the induced voltage to said feedback control unit.

For at least similar reasons as set forth above, the applied references do not teach or suggest at least these features of independent claim 15. Additionally, Toshiba does not suggest a PCB pattern disposed electromagnetically proximate to an electrical output of the high-voltage generator and to an electrical input of the light source unit. Thus, independent claim 15 defines patentable subject matter.

Independent claim 26 recites generating a high voltage based on the low DC voltage, applying the generated high voltage to a light source unit for providing light to the LCD panel, detecting a voltage induced from the high voltage applied to the light source unit, and determining, based on a level of the induced voltage, an abnormal condition of the high voltage

output. Independent claim 26 also recites inhibiting said high-voltage generation during a time corresponding to the abnormal condition by suspending said low DC voltage generating.

For at least similar reasons as set forth above, the applied references do not teach or suggest all the feature of independent claim 26. Thus, independent claim 26 defines patentable subject matter.

Accordingly, each of independent claims 1, 15 and 26 defines patentable subject matter. Each of the dependent claims depends from one of the independent claims and therefore defines patentable subject matter at least for this reason. In addition, the dependent claims recite features that further and independently distinguish over the applied references.

For example, the Office Action cites Oda for the features of dependent claims 6, 7, 24 and 27. However, these features relate to the detection of abnormal conditions. Oda does not suggest these features may be detected by using Toshiba's apparatus. Toshiba does not recognize these features. Thus, the applied references do not teach or suggest all the features of dependent claims 6, 7, 24 and 27. These dependent claims define patentable subject matter at least for this additional reason.

CONCLUSION

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. Favorable consideration and prompt allowance of claims 1-2 and 4-27 are earnestly solicited. If the Examiner believes that any additional changes would place the

application in better condition for allowance, the Examiner is invited to contact the undersigned attorney at the telephone number listed below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this, concurrent and future replies, including extension of time fees, to Deposit Account 16-0607 and please credit any excess fees to such deposit account.

Respectfully submitted,
KED & ASSOCIATES, LLP

David C. Oren
Registration No. 38,694

P.O. Box 221200
Chantilly, Virginia 20153-1200
(703) 766-3777 DCO/kah
Date: August 21, 2007
Please direct all correspondence to Customer Number 34610